

condition is secondary may be asserted most decidedly, as the Spatangida are palæontologically the youngest forms.

A remarkable organ is the "ovoid gland," the structure formerly designated the heart. So far as one is justified in judging from the extant results, we may regard it as an organ in which materials no longer available for the body are deposited. Blood-lacunæ open at the ends into it or surround it, as in the Echinida. No efferent duct has yet been found in any group.

The origin of the sexual products is of especial interest; they consist of primordial germ-cells (*Urkeimzellen*), as I have proposed to name these cells. They lie in the dorsal wall in an annular genital tube, on which five sacciform diverticula are formed, into which the primordial germ-cells pass. These diverticula form the first foundations of the sexual tubes. From the primordial germ-cells the ovicells are produced by growth &c.; and by division &c. the sperm-cells, as well as the whole of the epithelium which afterwards lines the sexual organs.

In mature animals these sexual tubes are atrophied. How far a similar origin of the sexual products from such primordial germ-cells prevails in all Echinodermata I shall show immediately in another place (*Zeitschr. für wiss. Zool.* Bd. xlv. Heft 1).

LI.—*On the Mammals collected by Captain C. E. Yate, C.S.I., of the Afghan Boundary Commission.* By J. SCULLY *.

MR. WOOD-MASON has asked me to contribute a paper on the collection of mammals and birds made by Captain C. E. Yate in Northern Afghanistan, and presented by that officer to the Indian Museum; the following notes are the result. The collection, I understand, was made after the departure of the naturalist of the Commission, so it may possibly include some forms not secured by him, and doubtless additional localities will now be made known for many of the species previously obtained.

* From a separate impression from the 'Journal of the Asiatic Society of Bengal, part ii. 1887, communicated by the Author. [The section relating to the Birds has not been reprinted, as it consists, almost exclusively, of a list of the species observed.]

The collection contains 13 species of mammals and 110 species of birds, those comprised in the first class being particularly interesting. I have carefully examined every specimen entered in the following list, and the identifications are as accurate as I can make them with the rather limited means of effecting comparisons. The localities and dates are carefully entered by Captain Yate on every ticket.

I have to express my thanks to Mr. Wood-Mason for giving me access to the collections under his charge at all sorts of unofficial hours, for permitting me to take most of Captain Yate's collection to my house for identification, and for procuring for me from many quarters sundry works for reference.

MAMMALIA.

1. *Erinaceus albulus*, Stoliczka.

This hedgehog agrees well with typical examples of the species to which I have referred it, from Yarkand. The fur on the whole lower surface of the body is white, the head and cheeks are pale rufescent fawn, the ears pale isabelline behind and white in front; the hands and feet are brown above, with a few white hairs intermixed. There is no nude area on the vertex; the spines measure 0·8 to 0·9 inch and have two dark and two pale bands, the tip being pale. Length of ear in front, from orifice, 1·45; fore foot 0·85, with claws 1·02; hind foot 1·4, with claws 1·53; tail 0·8. Teeth: i_{1-2} half the size of i_{2-3} ; c_1 has two fangs, anterior and posterior, pm_{1-2} two distinct fangs, pm_{2-3} three fangs, two buccal and one palatine. *E. albulus* seems quite distinct from *E. auritus*, with which I have compared it.

1. Maruchak, Murghab, Herat, May 23.

2. Badghis, Herat.

2. *Felis caudata* (Gray).

A flat skin, without skull. Nose to insertion of tail about 29·5 inches, tail about 13, hairs at tip of tail 0·7, ear from orifice at front 2·2, longest whisker 3·5, palma 3·2, planta 1·4. The ears are pointed, with a small tuft of hair at the apex measuring about 0·25. The general colour of the fur is above a pale yellowish grey, with dusky streaks, mainly along the centre of the back from nape to root of tail. Below, the fur is creamy white, with dusky spots showing through

here and there. The fur is soft and moderately long, grey at the base all over the body, then isabelline, and, where dark markings appear on the surface, the tips of the hairs are blackish. The head is grizzled grey, darker than the back, the sides of the nose pale fulvous, the cheeks white. The ears are pale isabelline behind, brown at the tips, and inside the hairs are whitish. The limbs are pale yellowish grey in front, with faint dusky markings near the body; inner side whitish, except the plantar and palmar surfaces, which are brownish black. Tail above on proximal half fulvous grey, with dusky dashes resembling those of the back, below whiter and almost free from dark markings like the belly; rest of tail greyish white, with four black rings and a black tip 1 inch long. This specimen is closer to *F. caudata* than to any other species with which I am acquainted; but from want of specimens for comparison and in the absence of the skull I cannot feel certain that the identification is correct.

1. Maimanah.

3. *Canis lupus*, Linn.

A flat skin, without skull. Nose to root of tail 37·5 inches; tail 12; hair at end of tail 2·5; ear from orifice in front 3·8. There is no black on the ears or the hind limbs; the fore limbs have a narrow black stripe down the front, ending about 6 inches above the point of the toes. Down the middle line of the back and along the upper surface of the tail the hairs are mainly black, and the tip of the tail is quite black.

1. Afghan Turkestan.

4. *Vulpes montana*, Pearson.

These are again two flat skins, without skulls. From nose to root of tail they measure about 29 and 31 inches; tail 15·5; hairs at end of tail 2·5. The face is rufous, with the usual dark patch below the eye; the ears are wholly black behind, the ordinary dark cross on the shoulders is present, and the tail-tip is white. One skin has the greater portion of the front of the fore limbs black; in the other this part is rufous; in both specimens the underparts are grey. In the larger animal, probably a male, the fur is much longer and softer and the tail more bushy than in the other; and the claws, which in both are unusually large, curved, and sharp-pointed, are more powerful. Both these skins can be fairly matched

in the large series of *V. montana* which I collected in Gilgit, and to that species I accordingly refer them.

1, 2. Afghan Turkestan.

5. *Spermophilus bactrianus*, sp. nov.

Ear-conch rudimentary, soles of hind feet densely haired, tail short, not longer than hind foot; hair on body harsh, very short, unicolorous.

Head and body (from skin) 9·5 inches; tail 1·5, with hairs at end included 2·2; fore foot without claws 1·25; hind foot without claws 2·25. On the head and whole body above and below the hair is very short, harsh, closely adpressed, and of the same colour throughout from base to tip. Upper parts nearly uniform pale fawn, the head slightly darker and more brown, and the rump more tinged with rufous; a pale isabelline band from nostril to eye. Tail like the rump, with a black subterminal ring and pale fulvous tip. Edges of lips, chin, throat, and whole lower surface, including inner aspect of limbs, creamy white. Outer aspect of limbs bright fulvous; upper surface of fore and hind feet pale isabelline, below to root of digits covered with creamy white hairs. The outer toe has a long pencil of whitish hair on its under surface which exceeds the tip of the claw by about half an inch. The vibrissæ are long, fine, and mostly brown, and a pencil of long glistening white hairs grows below the chin. The claws are black, with pale horny tips. There are three pairs of mammae. The skull is imperfect behind, and its total length cannot be given; the posterior end of the nasals extends further back than the termination of the premaxillæ:—

	in.
Greatest breadth of zygoma	1·3
Breadth of brain-case behind postorbital processes	0·78
Length of nasals	0·8
Breadth of nasals behind	0·2
„ of nasals in front	0·26
Premolar to symphysis of premaxillæ	0·6
Posterior margin of palate to incisors	0·98
Breadth of palate between <i>pm.</i> 2	0·27
Length of mandible, condyle to symphysis	1·3

From the characters already given for this souslik it could not be referred to any species of *Spermophilus* belonging to the section in which the hind feet are not haired below, e. g. *S. fulvus*, *S. rufescens*, *S. erythrogenys*, *S. brevicauda*, *S. mugosaricus*, *S. concolor*, or *S. musicus*. Of the section having well-haired soles *S. Eversmanni* and allies are also

excluded by the length of the tail; Middendorff gives the length of tail in *S. Eversmanni* as 4·2 inches, with terminal hairs 5·5. Of the short-tailed subsection *S. citellus*, *S. dauuricus*, *S. guttatus*, *S. xanthoprymnus*, and *S. mongolicus* are excluded for various but good and sufficient reasons, which to enumerate would be long. The only likely species that remains is *S. leptodactylus* of Lichtenstein, and to it I was at first disposed to refer the specimen collected by Captain Yate. The position of Lichtenstein's species is, in the first place, involved in doubt; it was distinctly described as having the hind feet haired below; but, according to Brandt (Bull. Acad. Sc. St. Petersburg, ii. p. 359), Eversmann proved to his satisfaction that *S. leptodactylus* was the same species as *S. fulvus*, which has the soles bare. However this may be, I have carefully compared Lichtenstein's detailed description of his *Citillus leptodactylus* ('Säugethiere,' tab. xxxii.) with the specimen under notice, and can only come to the conclusion that the latter is perfectly distinct, even if the question of hair on the soles be left out of consideration. In describing this species as new I have not overlooked Brandt's caution about the young of bare-soled sousliks having sometimes that part tolerably well covered with hairs.

1. ♀, Khamiab, Afghan Turkestan, June 12.

6. *Gerbillus*, sp.

Head and body about 5·4; ear at front from orifice 0·6; fore foot 0·38, with claws 0·45; hind foot 1·2, with claws 1·3. Fur long, fine, and very soft. Bright rufous-brown or fawn-colour above, many of the hairs black-tipped, the basal parts of the hair leaden grey; below the hairs white throughout their length. Ears fairly well haired, fawn-coloured behind, with a white margin, in front with scanty white hairs at the margins; whiskers white. Fore limbs white above and below, the palms naked; hind feet isabelline above, with whitish hairs on the soles, including the toes, except part of the hinder portion of the tarsus. The tail is imperfect; but its basal part for about 2·5 inches is coloured like the back above, and is slightly paler below.

The upper incisors are well grooved, the enamel folds of the upper molars are completely united in the middle, exactly as in *G. hurrianæ*, and the hinder molar has not a vestige of any posterior talon—the outline of the crown as seen from above being simply a narrow oval, with the points of the oval buccal and palatine. The following are the principal measurements of the skull:—

	in.
Total length	1.58
Breadth of zygomatic arch	0.85
„ of brain-case at posterior root of zygoma ..	0.69
Length of palate to incisors	0.69
„ of nasals	0.6
Mandible, condyle to symphysis	0.78

Although the upper molars agree best with those of *G. hurriance*, this specimen is quite different in character and colour of fur and in shape of skull; neither can it be referred to *G. erythrurus*, with which I have compared it. It possibly represents a new species; but, as the tail is imperfect, I do not propose a name for it.

1. ♂, Balkh, Afghan Turkestan, July 4.

7. *Mus bactrianus*, Blyth.

This specimen agrees fairly well with typical examples of *M. bactrianus*; but the tail is shorter than the head and body, though this is not of importance in a skin. In comparing this specimen, I have had occasion to examine many specimens of *M. pachycercus*, Blanford, from Yarkand; and I may note that that species is quite distinct from *M. bactrianus* and has been happily named.

1. ♂, Chahar Shamba, Maimanah, April 4.

8. *Arvicola Guentheri*, Danford and Alston.

Head and body 4.4 inches; hind foot 0.77; ear at front 0.4. The external form and colours agree well with the original description of the species from Asia Minor (P. Z. S. 1880, p. 62), except that in this specimen the rudimentary thumb of the fore foot has a small nail. The pattern of the molar teeth is very similar to that of *A. Guentheri*, with the following exceptions:—

In this specimen $\overline{m.1}$ has not the rudimentary fourth angle on the inner side so prominent; it is barely indicated. On $\overline{m.2}$, however, this posterior inner angle is distinct and must be counted, although in the original description above cited it is omitted. $\overline{m.3}$ has the posterior lobe less prolonged backwards, and tends less to form an angle on the outside than in the Asia-Minor species. $\overline{m.1}$, too, has the anterior lobe more compressed laterally in the present specimen. The following table exhibits the molar pattern according to the usual mode of counting:—

	Spaces.	External angles.	Internal angles.
$\frac{m. 1}{m. 2}$	5	3	3
$\frac{m. 2}{m. 3}$	4	3	3
$\frac{m. 3}{m. 1}$	6	3	4
$\frac{m. 1}{m. 2}$	9	5	5
$\frac{m. 2}{m. 3}$	5	3	3
$\frac{m. 3}{m. 1}$	3	2	3

1. Afghan Turkestan.

9. *Ellobius intermedius*, sp. nov.

Head and body (from skins) 4·5 to 5 inches; tail 0·4 to 0·45; hind foot 0·8 to 0·9; fore foot 0·55 to 0·67. Colour above, and on sides of head below the zygomatic projection, bright pale yellowish red (or bright rust-colour). Head dark brown. Below greyish white throughout. Tail pale fulvous, the terminal hairs at tip white. Fore and hind feet whitish. Fur short (about 0·35 on hinder part of back), very soft and fine; dark grey or leaden at the base, except on centre of belly, where it is white throughout its length. The bright colour of the upper surface being due to the short pale-coloured tips of the hair, any abrasion of these gives the animal a dark leaden-grey colour above.

Skull:—

	in.	millim.
Breadth across hinder part of zygomatic arches	1·05	27
„ of interorbital constriction	0·21	5·5
„ of brain-pan behind posterior termination of zygoma	0·62	16
Length from anterior molar to incisors	0·54	14
„ of upper molar series	0·32	8
„ of palate to incisors	0·86	22·5
Breadth of palate between anterior molars	0·14	4
Length of lower jaw, condyle to symphysis	1·05	27
„ of lower molar series	0·33	8·5

The nasals are shaped somewhat like a wine-bottle bent in at the sides, their external margins being nearly straight behind, then convex, then strongly concave, and, finally, convex again at the front end; the posterior ends are pointed, not truncated. The posterior ends of the premaxillæ extend quite 3·5 millim. behind the ends of the nasals and the same distance beyond the origin of the zygomatic arch. The zygomatic arch is high throughout; the maxillary process does not reach the squamosal along the lower margin, a square process from the malar interposing itself and forming the lower edge of the arch for a length of 1·5 millim.

The skull differs from that of *E. fuscocapillus* in having the nasal portion shorter, the distance from anterior root of zygoma to symphysis of premaxillaries being 15 millim. in *E. fuscocapillus*, against 12 millim. in the present species. The zygomatic arch is quite differently shaped, being higher throughout, and the malar bone forms part of the lower margin, while in *E. fuscocapillus* the maxillary and squamosal processes meet along the lower margin, so as to exclude the malar; and the anterior palatine foramina are much smaller and narrower.

From *E. talpinus* the skull of the present species differs completely in the shape of the nasals and in the extension backwards of the end of the premaxillæ. The shape of the zygoma presents even a greater divergence than from *E. fuscocapillus*; but the arrangement of the bones in the arch is closely similar in *E. talpinus* and *E. intermedius*. The anterior palatine foramina are very much smaller than in *E. talpinus*; and there are other differences which will be apparent on studying Mr. Blanford's very clear account of the contrast between the skulls of *E. fuscocapillus* and *E. talpinus* in J. A. S. B. vol. 1. pt. 2, 1834, pp. 122, 123.

Teeth. The incisors are very long and pure china-white. The molar pattern is as follows:—

	External angles.	Internal angles.
<u>m. 1</u>	3	3
<u>m. 2</u>	3	2
<u>m. 3</u>	3	2
<u>m. 1</u>	4	5
<u>m. 2</u>	3	3
<u>m. 3</u>	3	3

m. 1 and m. 2 do not differ from the corresponding teeth in *E. fuscocapillus* and *E. talpinus* in any important particular. m. 3 differs markedly from the corresponding tooth in *E. fuscocapillus*, and resembles that of *E. talpinus* in wanting a posterior lobe behind the hindmost outer angle; both the internal angles too are less prominent in the present species, the last angle being much rounded.

In m. 1 the anterior lobe is less developed than in *E. fuscocapillus*, but still there are four external and five internal angles, not three and four as in *E. talpinus*.

The three species of *Ellobius* may be thus contrasted:—

<i>E. talpinus.</i>	<i>E. intermedius.</i>	<i>E. fuscocapillus.</i>
1. Base of fur almost black.	1. Base of fur dark or leaden grey.	1. Base of fur light grey.
2. Zygoma low, malar interposed between maxillary and squamosal processes in lower margin.	2. Zygoma high throughout, malar interposed between maxillary and squamosal processes in lower margin.	2. Zygoma high in middle, maxillary and squamosal processes alone form lower margin.
3. Nasals convex externally.	3. Nasals bottle-shaped, or external margin alternately convex and concave.	3. Nasals bottle-shaped, or external margin alternately convex and concave.
4. Premaxillæ terminate posteriorly opposite end of nasals.	4. Premaxillæ prolonged behind hind end of nasals.	4. Premaxillæ prolonged behind hind end of nasals.
5. $\overline{m. 3}$ has no posterior lobe behind last outer angle.	5. $\overline{m. 3}$ has no posterior lobe behind last outer angle.	5. $\overline{m. 3}$ has a prominent posterior lobe behind last outer angle.
6. $\overline{m. 1}$ angles 3-4.	6. $\overline{m. 1}$ angles 4-5.	6. $\overline{m. 1}$ angles 4-5.

For the comparison of the three specimens collected by Capt. Yate, I have Mr. Blanford's very full description of a skin and skull of *E. fuscocapillus* (with figure of skull and teeth) in the paper before cited, and three skins and a skull of the same species in the Indian Museum. I have no specimen of *E. talpinus* for comparison, but Mr. Blanford has so clearly and, I am sure, accurately given the differences between that form and *E. fuscocapillus*, that I have no hesitation in deciding that Capt. Yate's specimen must be referred to a new species. The only known locality for *E. fuscocapillus* is Quetta, and the Russian *E. talpinus* is recorded by Severtzoff from Western Turkestan; so that the present species is intermediate in its habitat, as well as in its distinctive characters, between the two better known species of the genus. Severtzoff calls his Turkestan specimens *E. talpinus*, var. *rufescens*, and these may prove to belong to the species I have described.

Capt. Yate notes on the ticket of one of the specimens, "Eyes scarcely visible; caught by day."

1. Bokun, Murghab, Herat, May 10.
2. Kila Wali, " " May 14.
3. " " " May 26.

10. *Lagomys rufescens*, Gray.

The two examples collected belonging to a well-marked and well-known species need no extended notice; they agree perfectly with specimens collected by Blanford in Persia. The species was originally described from a specimen obtained in Afghanistan.

1. Shadian, Afghan Turkestan, August 2.
2. " " " August 6.

11. *Lepus Lehmanni*, Severtzoff.

This specimen is not in very good order, and I refer it rather doubtfully to the species described by Severtzoff (see Ann. & Mag. Nat. Hist. 1876, vol. xviii., "The Mammals of Turkestan"), with which, on the whole, it seems to agree best. So many species of Asiatic hares have been described which differ only in minute particulars as to make the task of identifying a particular specimen difficult and uncertain; for the number of nominal species probably greatly exceeds the constantly distinguishable forms. In the specimen obtained in the Hindu Kush the ears measure, from orifice in front, about 4·3 inches, at back 4·8, greatest breadth about 2·7. The anterior external part of the ear is coloured like the back; the posterior part being pale isabelline, black at the tip and partly down the posterior margin.

The general colour above is mixed pale fawn and black. The chin and belly are white, and the throat and breast pinkish isabelline. The basal part of the fur above, and where coloured on the limbs and breast, is grey; on the belly the fur is white throughout its length.

The premaxillaries end behind on a level with the nasals, the latter bones having the posterior end sloping inwards and the junction of their outer and hinder margins slightly rounded.

The mandible from condyle to symphysis measures 3·4 inches.

1. Hindu Kush, Afghan Turkestan.

12. *Gazella subgutturosa*, Güldenst.

Head and horns, with skin of head, preserved. Band from between horns to nostrils rufescent fawn. A pale isabelline band outside this from level of inner canthus of eye to upper lip. A dark rufous-fawn stripe from eye-pits to commissure of lips. The ear measures about 5·25 inches in length from orifice to tip in front. The horns from the base curve outwards, forwards, then backwards, and at the tips they curve inwards and forwards. There are twenty rings on each horn, and these end about 2·5 inches from the tips. The horns measure 14·7 inches in length along the curve in front, the distance of the tips apart is 6·9, the greatest distance apart 7·5, and the girth at the base about 4·5.

1. ♂, Badghis, Herat.

13. *Cervus cashmirianus*, Falconer.

This is a cast left antler of an elaphine stag, about which Capt. Yate gives the following information:—"This was a horn from the banks of the Oxus, near Balkh, and will help to determine the identity of the deer found in the jungles along that river." The antler is not perfect, as the beam is broken above the royal, so that the form of the crown cannot be ascertained; the following are the measurements:—

	in.
Length from burr to broken end of beam along curve inside	17·8
„ of brow tine, about	4·0
„ of bez tine, about	7·0
„ of royal tine along curve, about	7·7
„ of beam above upper angle of royal	6·9

Viewed in front, the beam is nearly straight (though of course inclined outwards) as far as the royal, where it begins to curve inwards. Viewed from the outer side, it curves slightly back from the bez and forwards to the origin of the royal; above the royal it curves gently back, and then forwards and inwards. The brow tine is straight and directed somewhat upwards: the much longer bez is directed outwards and upwards, and towards its tip it has a slight curve inwards; the royal is directed first outwards, then it curves at about 3 inches from the beam strongly upwards and inwards, the point being well inside the line of the broken end of the beam. Without measurement the bez looks longer than the royal, and the middles of the bez and brow tines, measured along the middle line of the beam, are 2·5 inches apart, or from upper margin of brow to lower margin of bez at junction with beam about 1·7 inches.

It is quite clear, I think, that this antler agrees better with that of *C. cashmirianus* than with that of any other deer to which it could be referred. It is quite distinct from *C. maral*, as figured by Sclater in Trans. Zool. Soc. vol. vii. I may mention that Mr. Wood-Mason, who examined this horn before I saw it, came to the conclusion that it must be referred to *C. cashmirianus*. Of course the evidence of such a fragment is not conclusive proof that the stag of the Oxus basin is really identical with the Kashmir species; complete specimens are necessary for the settlement of that point.

1. Banks of Oxus, near Balkh, Afghan Turkestan.